

Selected Topics: Prehospital Care

MOBILE PHONE USE FOR CONTACTING EMERGENCY SERVICES IN LIFE-THREATENING CIRCUMSTANCES

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Abstract—Background: The potential health benefits of mobile phone use have not been widely studied, except for telemedicine-type applications. **Study Objectives:** This study seeks to determine whether initial contact with emergency services via a mobile phone in life-threatening situations is associated with potential health benefits when compared to contact via a landline. **Methods:** A record-linkage study was carried out in which data from all emergency dispatches for immediately life-threatening events from a United Kingdom county ambulance service were linked to the Patient Admission System at two major local hospitals. Mortality (at the scene, at the emergency department [ED], and during hospitalization); transfer to the ED; admission (inpatient care, and intensive care unit); and length of stay were analyzed for calls classified as Code Red (immediately life-threatening) by initial exposure (mobile phone vs. landline), while controlling for potential confounding variables. **Results:** Of 354,199 ambulances dispatched to attend emergency incidents, 66% transported patients to the hospital while 2% stood down due to death at the scene. Mobile phone compared to landline reporting of emergencies resulted in significant reductions in the risk

of death at the scene (odds ratio [OR] 0.77), but not for death in the ED or during inpatient admission. The risk of being transferred to the ED and subsequent inpatient admission were significantly lower with reporting from mobile phones compared to landline (OR 0.93 and OR 0.82, respectively). **Conclusions:** In this study, evidence of statistical association was demonstrated between the use of mobile phones to alert ambulance services in life-threatening situations and improved outcomes for patients. © 2012 Elsevier Inc.

Keywords—emergency services; mortality; morbidity; mobile phone; record linkage

INTRODUCTION

Background

In emergency situations, a quick response is critical. The “golden hour” refers to the short period immediately after the onset of an acute illness or injury, during which administration of appropriate treatment has a significant impact on health outcomes. In the case of coronary heart disease, the National Service Framework stipulates that 75% of emergency calls should be reached within 8 min (1). There is evidence that further reducing this response time to 5 min could increase the survival rate for cardiac arrests by 10–11% (2).

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According to a residential survey in 2007, 75% of all adults in the United Kingdom owned or used a mobile phone and 92% of households had a landline (3). Existing research on health impacts associated with mobile phone use has mainly focused on the increased risk of accidents when using mobile phones while driving, and the possible harmful effects of long-term mobile phone use (4,5). Potential health benefits of mobile phone use have been less widely studied, except for telemedicine-type applications, but could include immediacy of access to emergency services, advice to bystanders, and victim first aid (6).

A telephone survey of mobile phone users in Australia ($n = 720$) showed that 12% had used mobile phones to report road accidents; 6% to report medical (non-road) emergencies; 1% to report a psychiatric crisis; and 0.14% to report a heart attack, epileptic seizure, or diabetic coma (7). More recently, a UK study showed that mobile phone use for reporting emergencies increased from 5% to 29% of total emergency calls from 1999 to 2004 in London, and the use of mobile phone in combination with a locator system was associated with an improvement in response times to accidents and other emergency situations (8). Automatic provision of location information for emergency calls from mobile phones was not available before September 2003, and accuracy is dependent on the density of network antenna sites (9).

Importance

To our knowledge, there has been no formal examination of the potential for improved health outcomes for patients through the use of mobile phones during emergency. Based on the assumption that mobile phone use can reduce the time between an emergency incident and its reporting, it might be expected that earlier intervention by emergency services will improve patients' probability of survival.

Goal of this Investigation

In this study, we tested the hypothesis that initial contact with ambulance services via a mobile phone is associated with reduced risk of death when compared to contact via a landline. This study examined whether patients hospitalized after initial contact with mobile phone were more or less severely ill, under the assumption that the more severe a patient's condition, the longer they would stay in the hospital, in particular, in intensive care. Finally, we also examined whether mobile phone use may have lowered the threshold for summoning help, measured as the proportion of patients transferred from the scene to the hospital.

MATERIALS AND METHODS

Study Design

We constructed a population cohort by record linkage. Mortality (at the scene, in the emergency department [ED], and during hospitalization), transfer to the ED, admission (to inpatient care and to the intensive care unit [ICU]), and corresponding length of stay (inpatient care and the ICU) were analyzed by initial exposure (mobile phone vs. landline), controlling for potential confounders described below in "Outcome Measures."

Setting

Oxfordshire Ambulance Service National Health Service (NHS) Trust (OAS) was responsible for providing all ambulance dispatches in emergencies in the UK county of Oxfordshire. In 2004–2005, Oxfordshire had an area of 1006 square miles, with a resident population of 608,000, an estimated transient tourist population of more than 9.3 million annually, with a significant rural component (10). Each emergency call received by the OAS is logged from the point of call to the point of delivery of the patient to the ED through an electronic system. The OAS dataset covered the period from January 1995 to June 2006 and included the telephone number from which the call originated, the address location of the caller, characteristics of the patient and the nature of the patient's condition, and the activity of the attending ambulance crew. Emergencies were coded and then assigned a series of alphanumeric codes based on the UK Department of Health-approved Advance Medical Priority Dispatch System, which uses structured protocols and systematic questioning of the 999 (emergency phone line) caller, and is used by over 75% of ambulance services (11). Only those dispatches designated as Code Red (i.e., immediately life-threatening) were included in this study. Postcodes were designated to the incident scenes from May 2001 and Ordnance Survey (OS) coordinates from April 2001. Before that, a local area coding system had been used. The OAS dataset covers the period from January 1995 to June 2006.

The Oxford Radcliffe Hospital NHS Trust (ORH) serves the Oxfordshire population through EDs at the John Radcliffe Hospital (JRH) in Oxford and the Horton General Hospital (HH) in Banbury, in the north of the county. Since October 2000 there have been, in addition, direct emergency admissions to a Medical Assessment Unit, and to a Surgical Emergency Unit at the JRH from November 2002. Data were available from the Patient Administration Systems (PAS) for each ED and separately for inpatients. For JRH, PAS data were available starting January 1995, but the HH ED PAS data were only available since March 1999.

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